Cher- work w/ someone to download the items circled on this page and page 2.
Joe

GLOBAL CLIMATE COALITION

Attention: U.S. "Non-Paper" from AGBM-5

"U.S. Draft Protocol Submission to UNFCCC"

Index of Climate Resources

Welcome to the Global Climate Coalition's Index of Climate Resources. This web site has been created to begin cataloging the available climate change resources on the internet, including web pages, gophers, newsgroups, FTP addressees and Telnet information. The Index has been broken down into categories of Science, Economics, Policy and other established Indexes of climate change information. We have also provided an index of GCC documents, reports and background information, detailing business and industry's views on climate issues.

The Index of Climate Resources will continue to expand as new sites are discovered. If you know of a site not currently listed, please email us with the appropriate information. Your consideration and cooperation will help this site thrive.

GCC Documents Directory

You can view and download a number of GCC background papers on science, economics and other issues. The GCC has the following materials currently available:

- ★ Background on the Global Climate Coalition
- ★ Policy Papers
- ★ Reports and papers available for ordering
- ★ ***Climate Watch Newsletter*** (Coming soon!)

UNEP.CH/IPCC/

Current Events in Climate Change

This will be really big.

- IPCC Second Assessment Report

  The Intergovernmental Panel on Climate Change (IPCC) has finalized its 1995 Second Assessment Report on the science of climate change. You can view and download the report from the IPCC's website. You will also find the Summary for Policymakers reports for each of the three IPCC Working Groups.

these will be short

- Upcoming UNFCCC Events 1997

- Timetable of International Climate Activities: 1979 - 1996

  The GCC has created a cronological timetable of the major international climate change meetings over the past three decades, beginning with the first World Climate Conference and including the latest conferences under the U.N. Framework Convention on Climate Change. Hyperlinks are provided for official reports, press releases and working papers. Keep coming back for the latest meetings and links.

For more information on this website
or other climate related resources on the Internet, contact:
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***Last Update*: January 28, 1997**

INTERMARKET
WEBSITE DEVELOPMENT

Economic Aspects of Proposals to Rapidly Reduce Carbon Dioxide Emissions

Prior to the eleventh session of the Intergovermental Negotiating Committee (INC-11), the United States government indicated that it will maintain its position that commitments for the post-2000 period under the Framework Convention on Climate Change (FCC C) are inadequate, and, additionally, that a new post-2000 aim must include all parties. At the same time, some groups continue to demand rapid and severe emission reductions for Annex I nations like that in the AOSIS draft protocol (20 percent carbon d ioxide emission reductions below 1990 levels by 2005). However, there are growing indications that emissions cannot be reduced as rapidly or as easily as some had believed. For example, the national communications submitted under the FCCC indicate that many Annex I nations will not meet their national goals of limiting emissions (carbon dioxide and/or all greenhouse gases combined) to 1990 levels by 2000¾and some components of those plans are questionable. This brief background paper highlights some of the economic issues involved in rapidly reducing carbon emissions and makes the following points:

- Annex I Country National Communications Indicate Problems in Reaching Goals
- AOSIS-Type Proposals Require Large and Rapid Annex I Country Emission Reductions
- Large and Rapid Reductions in Emissions Could Adversely Impact Developed Countries
- Rapid Reductions in Developed Country Emissions Will Adversely Impact Developing Countries
- Annex I Countries Have Limited Long-Term Impact on Greenhouse Gas Concentrations
- Policy Responses to Climate Change Must Reflect Evolving Knowledge

Annex I Country National Communications Indicate Problems in Reaching Goals

Annex I countries have set in motion programs that may significantly lower the path of future emissions. Additionally, comparison of plans during coming years will allow countries to identify options not considered in their own plan but used successfully in other countries. This likely synergy offers the opportunity for mid-course corrections in individual country policies - new no-regrets or low-regrets actions - that offer emission reductions with minimal disruption to the economy.

Although not acknowledged in most communications, the programs undertaken may have impacts on emissions far into the future. For example, the U.S. Climate Change Action Plan, released in October 1993 and the basis for the U.S. National Communication to t he Conference of the Parties (COP), estimated that the overall energy expenditure savings from the various programs over the 2001-2010 period would be almost three and one-half times the savings during the preceding decade.

At the same time, only six of fifteen reports evaluated in the INC Synthesis Report *(First Review of Information Communicated By Each Party Included In Annex I to the Convention,* dated 7 December 1994, see Tables 1 and 2) provide data indicating th e countries would reach a goal of limiting year 2000 carbon dioxide net emissions to 1990 levels. When net emissions of all greenhouse gases are considered and Germany (which did not report data for the year 2000) are included, then eight of the reports evaluated indicate that the countries would meet national goals of limiting net emissions to 1990 levels by the year 2000.

However, it is evident from the INC Synthesis Report that the 1990 emissions projection baseline for some countries was substantially higher than that country's emissions inventory baseline for 1990, making achievement of year 2000 national goals artifici ally easy. Additionally, some countries included in their projections programs which many not be implemented in a timely fashion or which have subsequently been rejected by national governments. For example, a second-stage increase in the VAT in Britain , which was assumed to reduce carbon emissions, has been abandoned. In Denmark, significant reductions in energy use are assumed to occur from appliance efficiency standards. However, implementation of the standards is dependent on acceptance and promul gation of EU standards¾a process that is only getting under way and for which the outcome is uncertain. Additionally, the Canadian National Communication assumes increases in the U.S. CAFE requirements (corporate average fuel economy) that are not includ ed in the U.S. plan. All of this indicates that reductions in greenhouse gas emissions may be more difficult than assumed by many nations, and perhaps that popular support for more rapid emission control programs is thin in many nations.

An informal aim of the FCCC arrived at through the artful linking of different parts of the Convention, that of limiting Annex I country emissions to 1990 levels by the year 2000, does not reflect the real world time consuming processes involved in develo ping and accepting the FCCC, formulating greenhouse gas limitation policies, and implementing those policies. The dates were developed in the FCCC negotiations in the very early 1990's but national policies were developed much later. As a result, nation s are faced with the formulation of policies that effectively require emission reductions originally suggested for a 10 year period to be completed within a 5 year period. For example, based on Australia's national communication, without greenhouse gas l imitation measures, Australia's emissions in 2000 would be 14% greater than in 1990. Due to the lags in international and domestic policy formulation, Australia effectively has 5 years to reduce emissions 14% below what they would have been, rather than 10 years. While perhaps politically infeasible, there are strong practical reasons for moving the current year 2000 national goals to some later year.

- **AOSIS-Type Proposals Require Large & Rapid Annex I Country Emission Reductions**

The draft protocol submitted by Trinidad & Tobago on behalf of the Alliance of Small Island States (AOSIS) requires each Annex I Party to "reduce its 1990 level of anthropogenic emissions of carbon dioxide by at least 20 percent by the year 2005..." [1] and to "adopt specific targets and timetables to limit or reduce other greenhouse gases not controlled by the Montreal Protocol...."

Any such target and timetable likely would require most Annex I countries to reduce carbon dioxide emissions by more than 20 percent over five years. This is because, as reported in the INC Synthesis Report (First Review of Information Communicated By Ea ch Party Included In Annex I to the Convention, dated 7 December 1994, see Tables 1 and 2), only six of fifteen reports analyzed

provide data indicating the countries would reach a goal of limiting year 2000 carbon dioxide net emissions to 1990 levels.

- **Large & Rapid Reductions in Emissions Could Adversely Impact Developed Countries**

There are few, if any, evaluations of the economic impact of a 20% emission reduction in a 5 year period. One of the closest scenarios was evaluated by DRI / McGraw-Hill in its January 1992 study, Economics Effects of Using Carbon Taxes to Reduce Carbon Dioxide Emissions in Major OECD Countries, for the U.S. Department of Commerce. This study assumed that the 12 largest OECD countries would stabilize their emissions at 1988 levels by 2000 (starting in 1994) and then reduce emissions by 10% by 2010. The marginal cost of carbon emission reductions ranged from $400 to about $1,300 per metric ton in this analysis. The DRI study found substantial reductions in GDP under the carbon reduction programs. Compared to the base case, economic activity declined b y about 1.0% to 3.5% in each of the 12 countries. By comparison, the AOSIS proposal requires emission reductions that are twice as large and completed in half the time assumed in the DRI scenario.

Subsequent to the DRI study it has been argued that reductions in economic activity could be moderated from the DRI results by "more efficient recycling" of carbon tax revenue. However, it also is true that "less efficient" recycling, through government spending programs or political selection of the recycling instruments, would exacerbate the forecast decline in economic conditions.

A project undertaken by the Energy Modeling Forum (EMF) also addressed 20% emission reductions by 2010 and found GDP reductions in the 1% to 2% range. Even policies that seek to limit carbon emissions in a gradual fashion are expensive. According to the EMF study, "The costs of stabilizing global carbon emissions appear likely to be in the range of about 4 percent of GDP per year by the year 2100."[2]

An important finding of the EMF study was that the more rapid the required reduction in emissions, the greater the cost. As a general principle, it was concluded that existing studies "demonstrate that trying to reach fixed emissions targets faster - say by 2010 rather than 2040 - imposes significant additional adjustment costs." [3] In comparing two specific emission targets, the EMF study concluded that a goal of reducing emissions 20 percent below 1990 levels by 2010 (a 45 percent reduction from a no -control baseline) had more than double the costs to society of a goal of stabilizing emissions by that 2010 (a 30 percent reduction from the no-control baseline).

What these models reflect is the real world costs associated with replacing society's physical capital (appliances, equipment, vehicles, and buildings) before the equipment has reached its replacement age. Very fast reductions in emissions require scrapp ing good capital equipment before its time, and replacing it with expensive new equipment that may involve new technologies that are not yet refined for most efficient use. A target and timetable approach that mandated a 20% emission reduction between 20 00 and 2005 would force very costly and premature turnover of capital equipment and therefore have costs significantly higher than that estimated either by the Energy Modelling Forum or DRI.

- **Rapid Reductions in Developed Country Emissions Will Adversely Impact Developing Countries**

There are no historical precedents for the massive reductions in Annex I country carbon emissions contemplated in an AOSIS-type protocol. Historically, the largest carbon emission reductions from developed country fossil fuel use followed the large energ y price increases in the 1970's. While economic conditions in the 1970s and 1980s were complex, it is useful to note the relative size of the coincident changes in the major Annex I country (the G7 nations) carbon emissions and economic growth in the non -G7 nations in those same years.

As is apparent from the figure below, a slowdown in G7 nation carbon emissions growth has historically been associated with a slowdown in the economic growth of non-G7 nations. Based on the statistically significant relationship over the 1971-1990 period (using data from the U.S. Energy Information Administration [4]), a 1 percent per year change in G7 nation carbon emissions has coincided with approximately a 0.4 percent change in the non-G7 nations' growth rate of gross domestic product (GDP). Based o n this historic relationship, a 1 percent decrease in G-7 carbon emissions would be associated with a 0.4 percent slowdown in non-G7 nation economic growth rates. While this exact relationship may not be hold in the future, it is indicative of a complex linkage between the economic conditions in the G7 nations, the energy they use, and the economic conditions in the rest of the world.

During the 1971-1990 period, increased G7 country payments to the rest of the world (directly for more costly energy and indirectly through foreign aid and debt restructuring) helped support economic growth in the rest of the world. However, under any pr ogram to rapidly and massively reduce Annex I country carbon emissions, there could be abrupt and large reductions in G7 country payments to the rest of the world not only for energy imports but for any commodity or product requiring energy intensive proc essing in Annex I countries.

Additionally, Annex I countries would be faced with the possible shift of carbon intensive economic activity to regions of the world without restrictive policies - this loss of economic activity would be accompanied by the simple relocation of carbon emis sions. Annex I countries could seek to limit this shift of economic activity by limiting imports of carbon intensive products. While it is difficult to assess these detailed trade and capital flow impacts in economic models, they are potentially large. These impacts could severely and adversely affect certain export sectors in many developing countries - with the accompanying loss of foreign exchange earnings and impacts on exchange rates.

- **Annex I Countries Have Limited Long-Term Impact on Greenhouse Gas Concentrations**

  As noted by Bert Bolin, Chairman of the Intergovernmental Panel on Climate Change, "Preliminary estimates using the central IPCC 92 scenario suggests that stabilization of greenhouse gas emissions at 1990 levels through 2100 by all Annex I countries would reduce annual emissions in 2100 by less than 15% and cumulative emissions by less than 10%...." [5] If cumulative emissions and therefore concentrations of greenhouse gases can significantly impact climate, then draconian actions by Annex I countries al one would have little noticeable impact on climate conditions.

- **Policy Responses to Climate Change Must Reflect Evolving Knowledge**

  Delaying costly policies to reduce emissions has a modest impact on likely greenhouse gas concentrations in future years and may significantly reduce the eventual cost of controlling emissions. This conclusion is evident in the Energy Modeling Forum work already discussed, as

well as other sources such as a recent U.S. Office of Technology Assessment report, Climate Treaties and Models: Issues in the International Management of Climate Change. The OTA report also concluded that "Presently articulated em ission targets have been stated with little regard for analysis of impacts."

Other new work, such as the analysis presented by Dr. Alan Manne at an American Council for Capital Formation conference, articulates the view that unless the risk of climate change catastrophe is large, society is best served by policies that undertake l ow-cost or low-regrets greenhouse gas limitation policies for 20 to 30 years while the potential impacts of climate change are better understood. Other new analyses, such as that being developed by the U.S. Environmental Protection Agency, emphasize the potential for adaptation should significant climate change begin to occur. Both of these new directions in the understanding of the economics of climate change argue strongly against the adoption of targets and timetables that call for radical and rapid reductions in greenhouse gas emissions

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Endnotes

1 Presumably the intent is to have Annex I countries reduce their net anthropogenic emissions of carbon dioxide in the year 2005 to at least 20 percent below 1990 levels.

2 John Weyant, "Costs of Reducing Global Carbon Emissions," Journal of Economics Perspectives, (Fall 1993), page 35.

3 John Weyant, "Costs of Reducing Global Carbon Emissions," Journal of Economics Perspectives, (Fall 1993), page 39.

4 U.S. Energy Information Administration, Energy Use and Carbon Emissions: Some International Comparisons, March 1994. A regression with the annual percent change in non-G7 nation GDP as the dependent variable and with the annual percent chan ge in G7 nation carbon emissions as the independent variable has a constant term of 3.17, a coefficient of 0.38 for the independent variable (with a t-statistic of 5.9), and an R2 of 0.66. The G-7 includes Japan, U.S., Canada, U.K., France, Germany, and Italy.

5 Bert Bolin, "Report to the Tenth Session of the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change", Geneva, August 22, 1994.

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Trends in Global Greenhouse Gas Emissions

Greenhouse Gas Emissions

According to research sponsored by the United Nations Environment Program, water vapor, which occurs naturally in the atmosphere, is the single most important greenhouse gas. It accounts for up to 90 percent of the warming that occurs when infrared radia tion from the sun is trapped by greenhouse gases in the Earth's atmosphere. These gases originate from such natural sources as plant and animal respiration, volcanic activity and from the oceans. Man-made ("anthropogenic") emissions also result from hum an activities such as energy consumption, agriculture and deforestation.

Historically, the majority of man-made greenhouse gas emissions have come from the industrialized countries. More recently, the rate of increase in man-made emissions from these nations has slowed. This is due at least in part to tremendous improvements in the efficiency of energy consumption. At the same time, the proportion of greenhouse gases originating in the industrialized West began to drop significantly. The reason? Aside from the energy efficiency improvements just mentioned, the percentage o f total global emissions from the West is rapidly declining due to the increasing greenhouse gas emissions from both developing countries and those with economies in transition.

In fact, the rate of increase in emissions from developing countries like India and China is so enormous that scientists now say emissions reduction efforts in the United States will have little impact on global emissions of greenhouse gases. Clearly, r eduction efforts should continue where they make economic sense. But, this trend does pose a serious challenge for policymakers, who must be able to show that costly mitigation efforts imposed on some countries will bring meaningful global results.

Greenhouse Gas Emissions From Developing Countries

Many developing nations and countries with economies in transition have experienced population surges and tremendous economic growth over the past two decades. Industrial sectors are growing rapidly and standards of living are slowly improving. The result has been an increase in the amount of energy these nations consume. However, the widespread use of outdated and inefficient technologies (by Western standards) has meant that increasing energyuse has outpaced economic expansion in these countries by 20 percent. [1]

Since 1970 energy consumption in developing nations has almost tripled, a rate of increase 15 times that of industrial nations, whose energy use rose only one-fifth as much as economic growth between 1973 and 1989. Developing nations today require 40 per cent more energy than industrial nations to produce the same goods and services. [2]

This trend likely will accelerate as developing nations struggle to accommodate the demands of growing economies and populations. The U.N. Population Fund estimates a six-fold increase in the Earth's population over the next two hundred years. Such popul ation increases, along with economic expansion, will result in greater energy demands. Even if per capita energy consumption remains at current levels, population growth alone will spur a 70 percent jump in global energy-use within 30 years. With high r ates of economic growth, developing countries could triple their

energy-use again by 2020. [3]

The inevitable result will be increased greenhouse gas emissions from developing nations. In fact, the U.N. Intergovernmental Panel on Climate Change (IPCC) estimates that by 2025, developing nations and countries with formerly centrally planned economie s will contribute 68 percent of global, man-made greenhouse gas emissions, rising to as high as 76 percent within the following 25 years. By 2025, China alone will emit more carbon dioxide than the current combined total of the United States, Japan and C anada, according to IPCC projections. The U.S. Department of Energy recently announced that, collectively, developing nations are already the world's greatest emitters of carbon dioxide.

- **Energy Efficiency and Greenhouse Gas Emissions in Industrialized Nations**

In contrast to the record of developing countries, industrialized nations have made significant improvements in reducing energy intensity (i.e., energy consumption per unit of GDP) since 1973. (Comprehensive data are available through 1988.) The World Res ources Institute reports that during this period, Japan's manufacturing sector decreased its energy intensity by 37 percent and the United States by 33 percent. Moreover, six European countries averaged a 29 percent reduction in energy intensity between 1973 and 1988. [4] Because these figures do not account for structural shifts toward less energy-intensive industries, overall energy performance actually improved much more - by 5 0 percent in the United States, 49 percent in Japan and 3 3 percent in Ger many. [5]

The United States provides a good example of how such efficiency can yield both economic and environmental benefits. From 1973 to 1988, the United States built 20 million new homes, put 50 million more vehicles on its roads and increased its GNP 46 perce nt. However, energy consumption increased only 7 percent. This efficiency, resulted in both cumulative energy savings of more than $1 trillion and reductions of industrial carbon dioxide emissions (per unit of output) of 37 percent. As a whole, U.S. man ufacturing reduced carbon emissions 8.1 percent while increasing production by 55.8 percent.

As these trends continue, industrialized nations will be responsible for a smaller share of global greenhouse gas emissions. By 2000, the United States and Western Europe each will contribute 19 percent of anthropogenic global greenhouse gas emissions. The IPCC estimates that these shares will drop to about 16 percent by 2015 and to 12 percent by 2050.

- **Reducing Global Emissions**

Developing countries could improve their energy efficiency and their economic competitiveness by using energy-efficient technologies currently employed by industrial nations. Investments in such technologies are a cost-effective way to reduce global green house gas emissions and could yield positive economic returns.

By helping developing nations reduce the amount of energy needed to expand their industries, the United States and other industrialized countries can reduce global greenhouse gas emissions, enhance the quality of life in developing nations, and provide jo bs both at home and abroad. Domestic environmental and economic policies should encourage the widespread investment and promotion of environmental technologies in developing nations.

The Global Climate Coalition, the leading business voice on climate change, is an organization of business trade associations andprivate companies established in 1989 to coordinate business

participation in the scientific and policy debate on the globa l climate change issue.

[1] Lenssen, Nicholas. "Empowering Development: The New Energy Equation." Worldwatch Paper 111, November 1992. p. 17.

[2] 1bid.

[3] 1bid, p. 16.

[4] World Resources 1992-93. Oxford University Press, 1992. p. 21. (with U.N. Environment Programme & U.N. Development Programme).

[5] The EOP Group, Inc. "Leadership In Energy Efficiency: A Comparison Of The U.S. Versus The Other Major Industrialized Countries." March, 1993.

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Science and Global Climate Change:

What Do We Know? What Are the Uncertainties?

About this backgrounder

In the past two decades, many scientists have raised concerns about the future of the earth's climate. In the 1970s, leading scientists raised concerns about global cooling, leading to predictions of a coming ice age. A few scientists still recognize a cooling potential.

In the mid-1980s, concern shifted to global warming, with a number of scientists stating their belief that the Earth was warming as a result of an increasing concentration of greenhouse gases in the atmosphere. Some scientists predicted dramatic increases in temperature, which would lead to the melting of polar ice-caps, rising of sea levels, and other catastrophic events. Today, after several years of investigation, many of these dire predictions have been moderated.

Global climate policy decisions must be made with the benefit of an adequate scientific understanding of the how and why of climate changes. Scientists remain divided on a number of climate change issues: Are increases of man-made gases contributing to global warming? What are the causes of global temperature change over the past century? How accurate are forecasts based on computer modeling? Will sea levels continue to rise? How will increases in carbon dioxide (CO2), a greenhouse gas, affect the world's plant life?

This backgrounder responds to these questions, which are being debated in the scientific community today, and provides a resource section for additional reading.

Are increases of man-made greenhouse gases contributing to global warming?

Scientists agree that the greenhouse effect is a real, naturally occurring phenomenon. Greenhouse gases trap the sun's warmth in the lowest layers of the atmosphere, keeping Earth warm enough to sustain life. Without the natural greenhouse effect the average surface temperature on Earth would fall to about zero degrees Fahrenheit (-18c). The earth's average temperature is about 60 degrees Fahrenheit (F), but in the natural greenhouse effect, atmospheric water vapor and clouds play a far greater role than other greenhouse gases. To put this in perspective, even if all man-made greenhouse gases were to disappear, water vapor and clouds would still leave us with almost all of the current greenhouse effect.

Scientists also agree that atmospheric levels of greenhouse gases (such as CO2) are increasing as a result of human activity. But scientists differ on the rate and magnitude of the "enhanced greenhouse effect" (warming) that will result due to the increase in the concentrations of these gases or warming of the planet, because the role of greenhouse gases in climate change is not well understood.

As an example of this uncertainty, a 1992 Gallup poll of climate scientists in the American Meteorological Society and the American Geophysical Union asked whether there has been any identifiable, human-induced global warming to date. Forty-nine percent of respondents said no; 33 percent said they did not know; and only 18 percent thought some warming has occurred.

What are the causes of global temperature change over, the last century?

Average surface air temperature readings appear to have increased about I degree Fahrenheit during the past 100 years. Just as the greenhouse effect is a natural phenomenon, so are climate cycles. While temperature records do not extend much before about 100 years ago, making it difficult to view the observed temperature change in the context of an overall trend, many scientists believe the observed increase in temperature within the last 100 years could be a result of natural fluctuations in climate. Notably, almost all the temperature increase in this century occurred before 1940, well before the majority of the increase in man-made C02 emissions.

Analysis of the temperature data records for the last 100 years are subject to several uncertainties, including the urban heat island effect, which can raise temperatures around measurement stations as urban areas expand. Urbanization increases everything from lighting to automobile exhaust and retained heat from buildings and roads. This heat island effect must be considered when looking at the long-term temperature record and may explain some of the global temperature increase.

Land-based temperature records show a warming trend in the 1980's. On the other hand, though not statistically distinguishable, satellite measurements have shown no global temperature trend over the past 14 years. The satellite techniques, which are relatively free from the distortions due to the relatively limited number of land-based measurement locations, offer the future promise of comparing observational records with global climate model projections.

How accurate are forecasts based on computer modeling?

Computer models, called General Circulation Models (GCM), are used to project future temperature and climate change scenarios. The fact is, however, that computer modeling is inexact and uncertain. All of the world's foremost climate modelers concede that today's models can not fully represent the complex interactions that determine temperature and climate. At this time, modeling is unable to resolve how, where, or even whether potential global climate change can affect specific regions of the planet.

Many scientists believe current climate models are an inadequate basis for policy decisions that could adversely effect our economy. The manner in which these models account for cloud cover and oceanic effects is among their greatest shortcomings. Even small modifications in these factors can dramatically alter model projections. Current climate models cannot credibly predict C02-induced climate changes. Today's models are only beginning to take into account the radiative effects of phenomena which counteract warming (such as sulfur dioxide emissions). The Intergovernmental Panel on Climate Change (IPCC) was formed in 1988 by the United Nations Environment Programme and the World Meteorological Organization to evaluate the science, potential impacts and potential policies for climate change. Presenting its findings, the IPCC stated, "Climate models are only as good as our understanding of the processes which they describe, and this is far from perfect."

Are sea levels rising?

There has been a great deal of speculation about a potential sea level rise if the global climate gets warmer. Since even the most dire predictions of warming trends over the next 1 or 2 centuries would still leave the polar regions well below freezing, most scientists question the predictions of a dangerous melting of the Greenland or Antarctic ice caps.

While most scientists agree there has been some observed rise in sea level over the last century, there are questions about the accuracy of sea level measurements. Taken primarily through tide-gauge records, sea level measurements are difficult to assess because of vertical land movements, atmospheric pressure,

winds, ocean currents and lunar cycles. With regard to the future, several recent studies suggest that warmer air temperatures could increase snowfall, decreasing the likelihood of sea level rise due to polar ice cap melting.

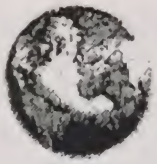
How will increases in C02 affect the world's plant life?

While scientists disagree on the link between C02 increases and any global warming, there is strong scientific evidence pointing to the link between C02 increases and improved plant productivity. Plant life "breathes" C02 as humans do oxygen. Recent studies have suggested, and most agricultural experts believe, that increasing atmospheric C02 levels may in fact accelerate plant growth, given adequate nutrients in the soil.

In summary

Sound policy-making rests on reducing scientific uncertainty. Focused research is critically needed to address the outstanding scientific uncertainties that surround global climate change. Although the U.S. federal research program is large, there has been debate over its focus. The usefulness of ongoing research will depend in large part on how well it can scientifically clarify answers to the questions facing both scientists and policymakers. The research must resolve the questions raised above as well as other key uncertainties such as: 1) What are the roles of cloud cover, the oceans, polar ice caps, soil and forests and their interactions? and 2) How can we differentiate natural climate variations from changes attributable to man-made emissions? If the research fails to address these and other issues, the result may be stacks of good scientific articles, but little progress in translating data into information that policy-makers can use to make effective decisions.

The Global Climate Coalition is an organization of business trade associations and private companies established in 1989 to coordinate business participation in the scientific and policy debate on global climate change.



SCIENCE AND CLIMATE CHANGE

Following is a list of resources relating to the science of global climate change:

(★'d items are new)

WORLD WIDE WEB

- **U.S. Energy Information Agency**

  - ☐ Energy Information Agency Home Page for the U.S. Energy Information Agency. This site includes the "Country Analysis Brief" as well as a new beta test program for tracking and compiling information on emissions.

- **IPCC (Intergovernmental Panel on Climate Change)**

  - ☐ IPCC A home page for the Intergovernmental Panel on Climate Change (This site is maintained by the Working Group II Technical Support Unit).
  - ☐ HDP Intergovernmental Panel on Climate Change (IPCC) information (From CIESIN)
  - ☐ IPCC HomePage Home Base for the Intergovernmental Panel on Climate Change
  - ☐ IPCC WGII Intergovernmental Panel on Climate Change Working Group II Chapters

★ A USCGRP report of the October 1994 Symposium on global change modeling

- **NOAA (National Oceanographic and Atmospheric Administration)**

  - ☐ Earth Information NOAA's Solid Earth Geophysics site (includes information on extreme events in weather patterns).
  - ☐ Geophysical Data NOAA's National Geophysical Data Center Home Page.
  - ☐ Paleoclimatology NOAA's Home Page for Paleoclimatology.
  - ☐ NCDC The National Climate Data Center, where you will find climate data compilations, reports, publications and related information.
  - ☐ ENSO Pacific El Nino - Southern Oscillation (ENSO) Applications Center Home Page for the NOAA funded pilot project.

★ Today's Space Weather From the NOAA offices

- **Climate Centers, Programs, and Research**

  - ☐ EHAP Environmental Hazards Assessment Program. This site includes an EHAP Home Page as well as medical and environmental links, risk assessment and DOE news and information.
  - ☐ ECONET Climate Home PageThe Climate Home Page for the Institute for Global Communications ECONET Network

- ☐ U.S. Global Climate Research Program This site includes information regarding a seminar series and relevant articles on climate issues.
- ☐ CDIAC Carbon Dioxide Information Analysis Center which includes information on the World Data Center - A for Atmospheric Trace Gases as well as data on global change.
- ☐ Gateway to Antartica The Gateway to Antartica, a resource on science, policy and education, developed and maintained by the International Center for Antartic Information and Research (ICAIR) and the Royal Society of New Zealand.
- ☐ CRU The Climate Research Unit, located at the University of East Anglia in Norwich, England. The home page is maintained by the Univeristy's School of Environmental Sciences.
- ☐ LDEO Home Page The Lamont-Doherty Earth Observatory and Columbia University. This site includes links to information on the El Nino effect as well as climate data.
- ☐ McGill Center for Climate and Global Change Research Home Page
- ☐ Paleoclimate Research Element of the US Geological Survey includes reserach projects as well as records of past climate change.
- ☐ CMDL Carbon Cycle Group The Climate Monitoring and Diagnostics Laboratory in Boulder, examines the global carbon cycle and the effects on climate. This site includes as well monitoring and measurement program information.
- ☐ Climate Prediction Center Home Page for the National Centers for Environmental Protection.

Bulletin Boards

- ☐ Linkages This is the site for the Earth Negotiations Bulletin, published at the First Conference of the Parties in Berlin, Germany (May 28-April 7, 1995)
- ☐ Earth Science BBS A Bulletin Board with Earth Science and Global Change information, images and data.

Meteorological Information

- ☐ WMO World Meteorological Organization site includes information regarding WMO programs and press releases and meetings.
- ☐ GISS Goddard Institute for Space Studies (Recent Values of Global Temperatures) site includes information on climate modeling, climate impacts, biogeochemical cycles, planetary atmospheres and additional research as well as education and resource tools.
- ☐ IEIS Geosciences Unidata Integrated Earth Information Server (IEIS) provides weather maps and oceanographic, seismic and environmental information as well as educational materials.
- ☐ The World Wide Web Virtual Library: Meteorology This site provides several indices based on available data, geographical regions, maps, forecasts, and satellite images as well as information on various climate centers.
- ☐ Satellite Image Details From the Purdue Weather Center
- ☐ Purdue Weather Processor This is designed as a weather tool for current and archived meteorological data.
- ☐ CIC The Climatic Impacts Centre at Macquarie University in Sydney, Australia. This site includes information about the center and its projects as well as other related organizations in the region.
- ☐ WeatherNet Connecting You to the World of Weather
- ☐ WeatherNet Tropical Weather Information/Forecasts
- ☐ University of Hawaii Tropical Meteorology This site includes information on storm tracking, El Nino, and regional reports.
- ☐ Tropical Cyclone Information This site includes information and facts regarding tropical cyclones and provides hurricane tracking charts.

NEWSGROUPS

- This site is under construction, more links will be added soon

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GOPHER

- This site is under construction, more links will be added soon

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FTP

- ☐ 1994 WG I Interim Assessment on Radiative Forcing
- ☐ NCAR The FTP site for the National Center for Atmospheric Research's DATA Support Section system, providing access to catalogs, documents, programs and other data files.
- ☐ IPCC An FTP site for Intergovernmental Panel on Climate Change documents and resources.
- ☐ USGCRP FTP site of IPCC Working Group II
- ☐ Christy-Spencer Satellite Data
- ☐ Tropical Cyclone Archives

TELNET

- ☐ IPCC WGII Working Group II Telnet Site

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